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METAL COMPOSITION OF SOME PLANT FOLIAGES

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ABSTRACT
Analysis of the metal composition of tender foliages of plants from different locations in the Federal College of Agriculture, Akure, Ondo State campus were carried out using standard method. The results, which referred to dry matter, emphasized the low proportion ($mgkg^{-1}$) of Mn (1.5-11.2), Fe (23.8-101.2), Cd (ND-27), Zn (7.6-15.3), Cu (1.4-8.7) and Pb (ND-2.1). Ca, Mg, Na and K contents were similar to other green vegetables. It is worthy of note, that the low concentration ranges of toxic metals, such as Cd and Pb in all the samples suggest that the environment was not polluted. Regular monitoring of the areas must be ensured to always meet the WHO limits.

KEYWORDS: metals, foliage, environmental pollution, monitoring, Akure, Ondo State.

INTRODUCTION

Plant foliages are essential to human and animals. They are used as vegetables, as spice to flavor, food, used in medicine as diuretic, haemetonic, carminative, antirheumatic, decreasing the risk of some types of cancer, as food for livestock animals just to mention a few. These foliages are in expensive, are easily and quickly cooked and are rich in several nutrients such as vitamins, minerals, proteins, etc (Abulude *et al*, (2005), Naeem *et al*, (1995), Gupta K. and D Wagle (1988), Guil-Guerrero *et al*, (1998).

The presence of large number of plant foliages, their abundance and their attributive qualities create interest to study the metal values of the selected samples. The analytical data would help in assessing the environmental pollution of the location.

MATERIALS AND METHODS

The foliage samples were obtained in April, 2005 within the Federal College of Agriculture, Akure, Ondo State, Campus. They were washed in distilled water, oven dried ($60^{O}C$), pulverized, sieved (2mm) and stored in air tight containers prior to analysis. The samples (0.5g) were dry ashed, dissolved and made up to $50cm^3$ using 10% HCl. An SP9 Pye Unicam spectrophotometer was used for the determination of metals in the samples following manufactures instructions. All data were statistically analyzed using an SPSS 10 for windows

RESULTS AND DISCUSSION

The study was of 15 plant foliage samples (Table 1) in which the levels of macro and micro metals and their variations were determined. Concentration ranges, the mean, standard error and coefficient of variation in percent values are given in Table 2. From the analytical results, it was observed that generally the concentration of the metals in the samples were comparable to those reported in the literature (Naeem *et al*, (1995), Gupta K. and D Wagle (1988), Guil-Guerrero *et al*, (1998). The comparisons were depicted in Table3. Ca, Na, Mg and K were the most prominent metals in concentration terms, followed in decrease order by Fe, Zn, Mn, Cu, Cd and Pb. The concentration range of Na was the highest (512-1420$mgkg^{-1}$) and that of Pb was the lowest (ND-2.1$mgkg^{-1}$) of all the investigated metals in this study.

The variations observed in this study compared with vegetables from other countries could be probably due to various factors such as trace metal content of the soil, metal constitutions of water used, geographical location, fertilizers and fungicides applied and industrial and livestock effluents (Rao, 1980). Akure, an urban town in Nigeria is rapidly developing, thereby significantly increasing industrialization, vehicular movement and agriculture land uses. These factors have been reported to have effects on environmental pollution (Abulude 2003).

Table1 Scientific and Vernacular names of the investigated plant foliages.

S/No	Common Name	Vernacular Name(Y)[a]	Scientific Name
1	Pawpaw	Ibepe	*Carica papaya*
2	Bitter leaf	Ewuro	*Vernonia amygdalina*
3	Basil	-	*Ocimum viridis*
4	Water leaf	Gbure	*Talinium triangulare*
5	Green leaf	Tete	*Amaranthus cruentus*
6	Cashew	Kaju	*Anacadium occidentale*
7	Mango	Mangoro	*Mangifera indica*
8	Cassava	Ege	*Manihot esculenta*
9	Egg plant	Igba	*Solanium melogena*
10	Okra	Ila	*Obelmoscuhus esculentus*
11	Bush tea	Effinrin-aja	*Hyptis snavolens L*
12	Bush okra	Eweedu	*Corchorus olitorius*
13	Marrow	Elegede	*Cucurbita pepo*
14	Indian spinach	Amunututu	*Basella alba*
15	Beans	Ewa/ Ere	*Vigna unguiculata L Walp*

[a] Y- Yoruba name

Table 2. Metal contents of plant foliage samples ($mgkg^{-1}DM$)

Number of Samples	Metals	Range	Mean	Standard error	Coefficient of variation (%)
15	Sodium	512 -1420	734.3	327.0	44.5
15	Potassium	454 -1805	781.8	353.6	45.2
15	Calcium	397.8- 858.2	585.8	152.9	26.7
15	Magnesium	481.7- 830	608.9	113.7	18.7
15	Manganese	1.5 - 11.2	5.8	2.4	40.6
15	Iron	23.5-101.2	51.7	24.3	46.9
15	Cadmium	ND -2.7	1.9	0.8	42.5
15	Zinc	7.6 - 15.3	10.0	1.9	19.4
15	Copper	1.4 - 8.7	5.8	2.5	46.6
15	Lead	ND -2.1	1.5	0.4`	23.6

The present report indicates that the foliage could provide the recommended dietary allowances to consumers (human and animals). It is worthy of note that the metal contamination in samples is not pronounced, but it would be recommended that frequent environmental monitoring should be ensured.

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Table 3: The concentration ($mgkg^{-1}$) of metals in samples from different areas

Area	Na	K	Fe	Ca	Mn	Cd	Zn	Mg	Cu	Pb
Vegetable, Spain[a]	1903-330	5084-6225	-	324-990	9.0-12.0	-	7.2-8.8	289-1034	2.5-31	-
Vegetables, Pakistan[b]	11250-54490	20760-48930	1150-9260	-	66.5-127.2	0.14-2.78	43.61-75.13	-	6.23-9.35	0.63-3.28
Vegetable, India[c]	2.3-381.8	5.9-380.3	2.5-7.3	87-296	04-1.4	-	0.3-0.5	25-101	0.8-1.6	-
Plant foliages, Nigeria[d]	512-1420	454-1805	23.8-101.2	392-858.2	1.5-11.2	ND-2.7	7.6-15.3	481.7-830	1.4-8.7	ND-2.1

[a]Guil-Guerrero *et al*, 1998; [b]Naeem *et a,l*1995*;* [c]Gupta and Wagle, 1988; [d] Present Study.

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